

## Comet Encke's Dust Trail

William T. Reach (SIRTF Science Center/IPAC/Caltech), Mark V. Sykes (Steward Observatory/U.Arizona), John K. Davies (Joint Astronomy Center)

We observed comet 2P/Encke with the Infrared Space Observatory in July 1997, when the comet made a close (0.25 AU) approach to Earth. The nucleus saturated the central pixel of our image, but the lower limit to nuclear flux yields a lower limit to nuclear radius of 1 km. Cometary dust extends over much of the image, comprising a coma, tail, and trail. The coma is asymmetric, with a surface brightness at 12 microns of  $33/T$  MJy/sr where  $T$  is the angular separation from the nucleus in arcminutes. The tail is very broad, and it deviates significantly from the anti-solar direction, from which we infer a particle size of order 20 microns and a mass of  $1e11$  g. The dust TRAIL is a straight line, stretching across our image for more than 35 arcmin. The core of the trail is 2 arcmin (22,000 km) in width both ahead of and behind the comet, with a fainter, wider component, shifted from the core of the trail, appearing behind the comet. The mass of the portion of the trail in our image is more than  $1e12$  g, for the minimum particle size of 1 cm suggested by dynamical simulations of particles ejected from the nucleus. Scaling to the entire length of the trail, as seen in the IRAS data, the total trail mass is of order  $1e14$  g, or larger. The mass of the dust trail is far greater than that of the tail or coma, and the dust mass loss rate is much greater than the gas mass loss rate, supporting the idea that comets are composed more of solid material than of gas or ice.